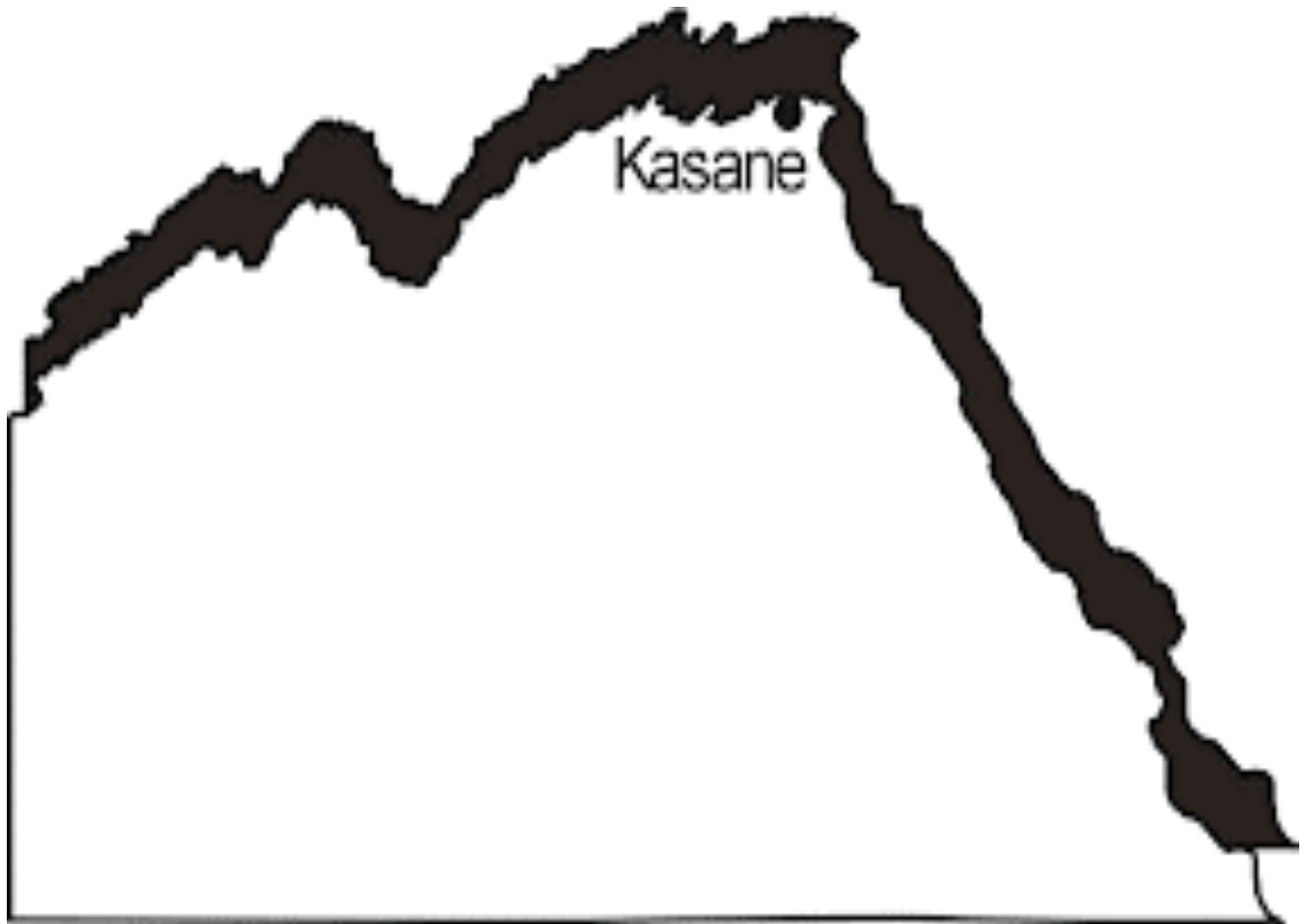




CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN



environment wildlife & tourism
MINISTRY



2016 – 2020

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN



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CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Plan Endorsed by Chobe District Bush Fire Management Stakeholders.

AGENCY
Department of Forestry and Range Resources- DFRR
Department of Wildlife and National Parks- DWNP
Botswana Police Services- BPS
Botswana Defence Force- BDF
Office of District Commission- ODC
Civil Aviation Authority Botswana- CAAB
Chobe District Council- Fire Brigade Department
Botswana Tourism Organisation- BTO
Department of Labour
Chobe Enclave Conservation Trust- CECT
BIO- Chobe Project
Kavango- Zambezi Transfrontier Conservation KAZA
Okavango Research Institute- ORI
Caracal Biodiversity Centre/ Enviro – 911
Farmers Association (Chobe East and Chobe West)
Hotel and Tourism Association Botswana- HATAB
Tribal Administration- Chobe
Chobe Landboard- CLB
Village Leaders (Dikgosi)
Ministry of Agriculture- MOA (Dept. of Crops and Veterinary Services)
Department of Metereological Services
Elephants Without Borders
Department of Health Management Team- DHMT

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GLOSSARY

Assets:	Anything valued by the community which includes houses, crops, heritage buildings and places, infrastructure, the environment, businesses, rangelands and forests, that may be at risk from bush fire.
Bush Fire:	A general term used to describe fire in vegetation, includes grass fire.
Bush Fire Hazard:	The potential severity of a bush fire, which is determined by fuel load, fuel arrangement and topography under a given climatic condition.
Bush Fire Risk:	The chance of a bush fire igniting, spreading and causing damage to the community or the assets they value.
Bush Fire Risk Management:	A systematic process that provides a range of treatments which contribute to the well-being of communities and the environment, which suffer the adverse effects of wildfire/bush fire.
Bush Fire Threat:	Potential bush fire exposure of an asset due to the proximity and type of a hazard and the slope on which the hazard is situated.
Consequence:	Outcome or impact of a bush fire event.
Fire Fighting Authorities:	DFRR, Fire Brigades, and DWNP.
Likelihood:	The chance of a bush fire igniting and spreading.
Major Bush Fire:	A bush fire which requires the attendance of multiple fire teams, or causes damage to property or injury to one or more persons.
Display area:	Geographic area determined by the Chobe District Disaster Management Committee which is used to provide a suitable area and scale for community participation and mapping display purposes.
Recovery costs:	The capacity of an asset to recover from the impacts of a bush fire.
Acceptance:	An informed decision to accept the consequences and the likelihood of a particular risk.
Risk Analysis:	A systematic process to understand the nature of and to deduce the level of risk.

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Risk Assessment:	The overall process of risk identification, risk analysis and risk evaluation.
Risk Identification:	The process of determining what, where, when, why, and how something could happen.
Risk Treatment:	The process of selection and implementation of measures to modify risk.
Vulnerability:	The susceptibility of an asset to the impacts of bush fire.

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1.0 INTRODUCTION

1.1 Background

During the 2008 fire season in Botswana large tracks of land were indiscriminately burnt. After this event the Botswana Government looked to outside assistance to help them prevent, mitigate, and suppress Bush Fires in Botswana.

The New South Wales Rural Fire Service (NSW- RFS), from Australia was chosen from many submissions to assist Botswana by describing, and demonstrating all that Australia knew about suppressing wildfires. Australia and Botswana have similar climates and issues regarding bush fire. In addition, Australia depends on a volunteer culture and workforce which their Botswana counterparts were keen to employ.

Bush Fire Risk is defined as the chance of a bush fire igniting, spreading and causing damage to assets of value to the community. Assets of value to the community include:

- Human settlement (life and property)
- Economic (buildings, livestock, crops and forests)
- Environmental and
- Cultural heritage

Bush Fire Risk Management involves identifying the level of risk posed by bush fires to assets and establishing strategies to protect these assets from the adverse effects of bush fires. The purpose of bush fire risk management is to protect the community and its values from the adverse effects of wildfire. The outcome sought, is to achieve better integration of community preparedness and prevention strategies as key elements of bush fire management.

The strategies established in the bush fire risk management plan address:

- The bush fire hazard
- The vulnerability of assets to fire
- The safety of the community and fire fighters
- The protection of the land and environment from fire and
- The recognition that biodiversity can be managed through the application of appropriate fire regimes upon the landscape.

All owners and land managers have a duty to prevent the occurrence of bush fires on their land and to minimise the danger of the spread of bush fires on or from their land. This responsibility is legislated under section 7 &10 of the *Herbage Preservation Act 1977*.

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This Bush Fire Risk Management Plan (BFRMP) has been prepared for the Chobe District Disaster Management Committee (CDDMC). The committee comprises of all government departments and parastatals.

The plan identifies the level of bush fire risk across Chobe District and establishes strategies that the responsible land managers will implement to manage the bush fire risks identified.

The *National Disaster Risk Management Plan 2009* relates to the coordinated arrangements for managing emergencies across Botswana. This Plan establishes the requirement for the Ministry of Environment, Wildlife and Tourism to:

- Identify areas of high and low risk to wildfires
- Facilitate the construction, maintenance, and monitoring of fire break
- Facilitate the development of National, District and Village Bush Fire Management plans
- Facilitate the management of wildfire through the prevention, suppression, prescribed burning, and periodic monitoring of fire within Botswana.

1.2 Scope of the Plan.

1.2.1 Area

The Chobe District Fire Risk Management Plan covers the entire District, comprising of Chobe East and Chobe West, approximately 22052Km² or 2205200 Hectares (Ha).

1.2.2 Purpose

The plan is a strategic level document which:

- Identifies the level of bush fire risk across the Chobe District as managed by District Disaster Management Committee.
- Develops strategies that will be implemented to manage the identified bush fire risks and
- Identifies the land managers responsible for implementing the BFRMP.

1.2.3 Period of Operation

Once approved by the Head of Bush Fire Management Division (or proposed Botswana Rural Fire Service - BRFS) on behalf of Ministry of Environment, Wildlife, and Tourism (MEWT) this plan will have a life of five years. It is anticipated that the plan will be reviewed within the five year time frame as necessary.

Annual bush fire risk management programmes will be developed by the responsible land managers to implement the plan.

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

1.3 Aim and Objectives of the Plan

1.3.1 Aim

The aim of the Chobe bush fire risk management plan is to provide for the coordinated prevention and mitigation of bush fires for:

- Minimising the risk of adverse impact from bush fires on life, property and the environment.
- The protection, maintenance and wherever possible the enhancement of the natural and cultural values of the area through the management of appropriate fire regimes.

To give effect to this aim, the committee has developed appropriate risk management objectives and strategies.

1.3.2 Objectives

The objectives of the Chobe Bush Fire Risk Management Plan are to:

- Reduce the number of human-induced bush fire ignitions that cause damage to life, property and the environment;
- Manage fuel to reduce the rate of spread and intensity of bush fires, while minimising environmental/ ecological impacts;
- Reduce the community's vulnerability to bush fires by improving its preparedness; and
- Effectively contain fires with a potential to cause damage to life, property and the environment.

1.4 Description of Chobe District

1.4.1 Location and land tenure

Chobe District is located at the Northern tip of Botswana, with diverse flora and fauna. The district is covered by dense forest inhabited by varied wild animal species, attracting tourists all over the world that has significant contribution to the country's economic growth and development.

The District borders the following countries: Zambia at the North, Zimbabwe on the East and Namibia on the west. This geographic positioning makes the district to be at the highest risk of importing communicable diseases to the country. Moreover, the district being surrounded by Caprivi - Chobe Rivers and Lake Liambezi, it poses a greatest risk of flooding, as it has been documented in the past.

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

The District is made up of and covers the following: Sibuyu Forest Reserve, Pandamatenga Village, Maikaelelo Forest Reserve, Lesoma Village, Kazungula Village, Kasane Township, Kazuma Forest Reserve, Kasane Extension Forest Reserve, Kasane Forest Reserve, Chobe National Park, Mabele Village, Muchenje, Kavimba Village, Kachikau Village, Satau Village, Parakarungu Village, and Nunga Wildlife Management Area See **Figure 4**.

Table 1: Land use and vegetation types

Different land use and vegetation types of the district		
Land use type	Dominate Vegetation type	Hectares
Chobe National Park	Teak/ Terminalia/ Mphane/ Acacia woodlands	1170000 Ha
Chobe Forest Reserve	Teak/ Terminalia woodlands	137497 Ha
Maikaelelo Forest Reserve	Mophane/ Teak woodlands	52723 Ha
Sibuyu Forest Reserve	Terminalia/ Teak woodlands	116199 Ha
Kazuma Forest Reserve	Teak/ Acacia woodlands	16148 Ha
Kasane Forest Reserve Extension	Teak woodlands	64111 Ha
Kasane Forest Reserve	Teak woodland	14931 Ha
TOTAL		2 148 609Ha

1.4.2 Climate and bush fire season

The typical/ average climate in Chobe has an average summer monthly maximum temperature of 34°C (October – November) and an average winter maximum temperature of 21°C. The average low temperatures are 26°C in summer and 8°C in winter. Most of the rain is summer predominant with average annual rainfall of 550mm and 650mm. The area experiences high relative humidity. These areas generally experience a longer fire season. The bush fire season generally runs from June to November for the majority of the District. Prevailing weather conditions associated with the bush fire season in the Chobe are usually easterly to south east winds accompanied by high daytime temperatures and low relative humidity.

1.4.3 Population and demographic information

The population of the Chobe District area is approximately 23,347 as per the 2011 Botswana Population Statistics. The major population centres are Kasane - Kazungula Areas. The following issues have been identified within the Chobe District as potentially impacting on the ability of certain sections of the community to prepare themselves for bush fire: Lack of ownership to asset by locals and lack of protection around lodges and houses, Some locals burning ploughing fields without control lines and consultations, Increase in tourists camping within the park and forest reserves during the peak season, Access to fires not easy due to lack of fire trails/ roads.

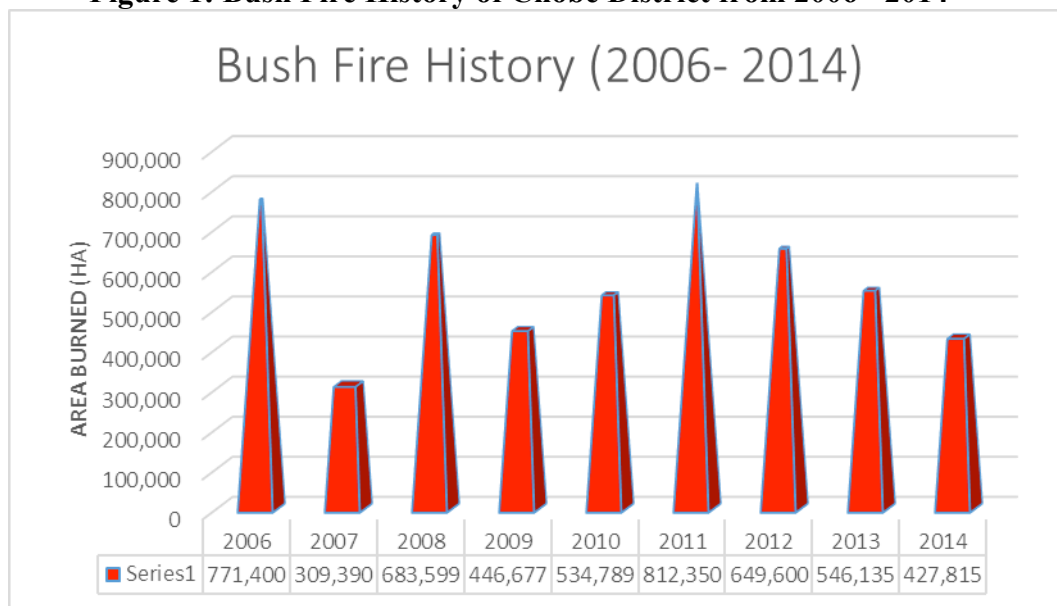
1.4.4 History of bush fire frequency and ignition cause

1.4.4.1 History of Bush Fire Frequency

Chobe district has a subtropical climate, and receives an average of 600mm of annual rainfall. The rainfall pattern therefore leads to a high biomass accumulation or fuel load. The high fuel load explains the high incidences of intensive fires that are experienced in the District annually. The high temperatures between September and December averaging 35° Celsius worsen the situation by drying the fuel load. For the past years, fires were crossing from neighbouring Zimbabwe into Botswana (and the other way around) near Lesoma and Pandamatenga villages. Yearly fires normally occur at Kasane Extension Forest Reserve, Chobe National Park around Phoha Camp and Sibuyu Forest Reserve. A total of 110 fire incidences have been recorded by DFRR office in Chobe between 2006 and 2014. Appendix 7 and 8 in page 39, 40 shows burnt scars for 2010 and 2014 respectively.

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Figure 1: Bush Fire History of Chobe District from 2006 - 2014



1.4.4.2 Ignition Cause

The Chobe District has on average 20 bush fires per year, of which 3 on average can be considered to be major fires.

The main fire sources within the Chobe District area are:

- **Indigenous Burns/ Practices**

There are some cultural practices that are practiced within Chobe District that cause fires. San, Christians, traditional doctors use fires in their rituals and therefore Fire Management agencies should work closely with them for safer methods to do that.

- **Cross Border Fires**

Most spot fires are from neighbouring countries Namibia, Zambia and Zimbabwe as the District experiences heavy winds during fire season. Therefore joint border patrols and community awareness must be strengthened by the Fire Management agencies of these four countries.

- **Malicious Fires (Arson)**

People deliberately set up bush fires illegal this might be due land use conflicts issue.

- **Escaped camp fires**

Legal and illegal camping of tourists and truck drivers tend to make fires to prepare food, scare animals and at the end of the process they don't completely put out the fire and the fires gets on and burn the Forest.

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- **Machinery and Vehicles**

Old Machinery/ vehicles not well maintained give ignition out through the exhaust and burning the grasses along the main roads.
- **Poachers**

People illegally hunting usually start fires around their villages to attract animals when they come for green fresh grass after burning and make killing. Also illegal trophy hunters use fires to keep the law enforcement officers busy so that they make killing without being searched.
- **Smoking**

Tobacco smokers throwing cigarettes on moving vehicles and as most of the roads have tall grasses then fires starts.
- **Lightning Strikes**

Lightning is one of the natural causes of wildland fires in the District especially during the rainy season which is accompanied by thunder storms. However most of fires are caused by human activities.

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2.0 LEGISLATIVE, POLICY, PLANS AND STRATEGIC FRAMEWORKS

The following frameworks have an impact on fire management in Botswana:

- Forest Policy of 2010
- National Policy on Disaster Management of 1996
- National Disaster Risk Management Plan
- Herbage Preservation Act of 1977
- Forest Act of 1968

2.1. Forest Policy of 2010

Forest Policy is a framework that provides for guidance and facilitation in the management of forest and range resources of the country through conservation, development and sustainable use. Wildland fire management is one of the topics covered in the Forest Policy. Management of Wildland fires will ultimately have a bearing on the achievement of the main objective of the policy, which is, conserved and sustained use of forest and range resources.

The Forest Policy provides for an integrated Wildland fire management approach that will enhance the fire management capacity, promote biodiversity and ecosystem integrity, and enhance human health and safety, as well as promoting social, cultural and economic benefits. The Policy aims at;

- a) Developing and strengthening Wildland fire management institutions for effective coordination of fire management activities.
- b) Promoting the development of fire management plans.
- c) Develop capacity of interagency, local communities and land owners through knowledge transfer and skills development.

2.2. National Policy on Disaster Management of 1996

Bush fire is one of the identified potential disasters which may occur in Botswana. The National Policy on Disaster Management provides for comprehensive Disaster Management programme based on a series of activities aimed at reducing the impact of future disasters as well as reducing vulnerability. The policy also ensures that effective disaster preparedness measures are put in place in order to cope with disasters when they occur. It further provides for activation and effective emergency response and recovery plan.

2.3. National Disaster Risk Management Plan

The National Disaster Risk Management Plan is the central disaster risk management for Botswana. It provides for a framework for sector Disaster Management Plans to be prepared by all Ministries and Organizations as well as Contingency plans for hazard specific preparedness plans, to be prepared at National, District and Village level.

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2.4. Herbage Preservation Act of 1977

The Herbage preservation provides for;

Prohibition of Burning Vegetation

- You cannot, without the permission, in writing, of an appropriate authority, set fire to any vegetation on land which you are not the owner or lawful occupier.
- You cannot wilfully or negligently light a fire, which by spreading damages or destroys, or threatens the property of another person.
- You cannot for the purpose of hunting or capturing of any animal, drive or surround such animal by means of fire or cause any grass or bush fire.
- In a forest reserve you cannot, without a license or appropriate authority, set fire to any grass or undergrowth or leave unattended a fire, which you have lit.
- In a national park you cannot wilfully or negligently cause any veld or forest fire.
- An appropriate authority may, by order, prohibit the burning of vegetation within its area of authority either generally or specifically in location and timing.

Firebreaks

- If requested in writing by a neighbour you need to provide assistance in the establishment of firebreaks on common boundaries or contribute half of the labour or cost.
- An appropriate authority within its area of jurisdiction may, by order, require the construction and maintenance of firebreaks on your land

Notice of Intention to Burn

- You must give reasonable notice of intention before burning vegetation on your land to all owners or occupiers of adjacent land and, where reasonably practicable, to a police officer or headman.

Duty to Extinguish Fires

- You are required to carefully and properly extinguish any fire lit or used by you on any land of which you are not the owner or lawful occupier.
- Where a fire is burning you need to provide assistance to control, extinguish or prevent the spread of fire when requested by an appropriate authority.
- Any able-bodied person in the vicinity of such fire may be called upon to assist to control or extinguish or prevent the spread of the fire.
- Acting in good faith, you may enter upon any land for the purpose of controlling, extinguishing or preventing the spread of a fire that may become a danger to life or property.

Protection of Life, Person and Property by Counter-firing (Back burning)

- When life, person or property is in danger from an approaching fire you may light a counter-fire to prevent loss or injury of life, person or property. You must take reasonable care the fire does not spread beyond the limits necessary.

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2.5 Forest Act of 1968

The Forest Act deals with bush fires occurring in forest reserves. Section 30 of the Forest Act provides for responsibilities of individuals or persons appointed by law with regard to extinguish bush fires in forest reserves. There is also provision for penalties for any contraventions of the Act.

Note: Some of the laws are still under review and as soon as they are in the implementation stage there is need to be considered.

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3.0 IDENTIFYING AND ASSESSING THE BUSH FIRE RISK

This plan contains a number of strategies that are directed at addressing the risk to community and environmental assets. This is generally achieved through addressing those factors which comprise the risk being the bush fire hazard (principally the fuel), the sources and pattern of ignitions and the vulnerability of the assets at risk

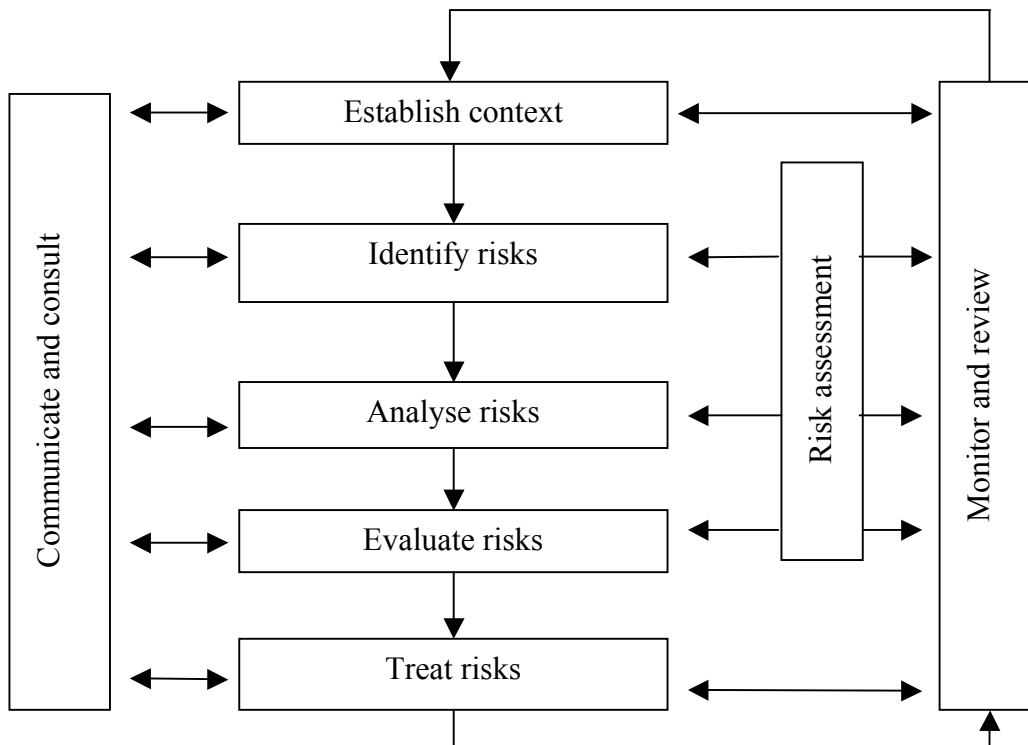
Identification of the level of bush fire risk within the Chobe District involved analysis of the following key components:

- The bush fire issues within the Chobe District;
- Potential bush fire hazard
- Human settlement areas
- Economic assets
- Environmental assets
- Cultural assets

3.1 Process

The risk assessment process was used as basis for bush fire management. See Figure 2 for the steps involved.

Figure 2: Overview of the risk assessment process



3.1.1 Communication and Consultation

Community participation is an integral part of risk management. The Community Participation Strategy involved developing and implementing a process to address the needs, issues and concerns of stakeholders within the District in regards to the BFRMP.

The District Disaster Management Committee consults relevant stakeholders that include the following:

- Local Community Leadership
- Land Managers
- Business people (tourism industry) and
- Farmers Association

3.1.2 Identifying the Bush Fire Risk

Identifying the level of bush fire risk firstly involved

- Identifying important community assets considered to be at risk from bush fire in the Chobe District and
- Assessing the likelihood and consequence ratings.

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3.1.3 Assets

Chobe District Disaster Management Committee members and the community, identified assets within the District that they believed were at risk of bush fire. The assets were divided into four asset types:

a) **Human settlement**

The human settlements (villages and Town) have the lowest fire risk as compared to other assets types. This is because the areas around the human settlements have low fuel loads and therefore the likelihood of bushfires affecting human settlement is very low assessed in terms of threat to life and property.

b) **Economic**

- **Agricultural;** e.g. major silos, regional saleyards, cropping/ grazing land; The District has frequent occurrence of foot and mouth disease and therefore livestock off take is very low, as a total ban on movement of beef and other products from cattle is normally employed as a measure to contain disease.
- **Commercial/ industrial** e.g. major industries, waste treatment plants, sawmills, Dumping site; Landfills and sewerage facilities has high fire risk as there are located outside the built up area and fuel load around them need to be managed.
- **Infrastructure** e.g. large power lines, gas and oil/fuel station, railway lines, electricity Substations, communication facilities (towers and lines), tarred roads; It is important to highlight the infrastructure that has high fire risk will be the infrastructure which is outside the built up areas like town and villages. The infrastructure within the built up areas is at low risk because the likelihood of bush fire occurring in these areas is very low.
- **Tourist and recreational** e.g. tourist sites and facilities, resorts, lodges; The District attracts a number of tourists locally and internationally due to abundance of Natural Resources. The sector is exposed to bush fires as there are located at high fuel load areas, built from flammable materials e.g. wood and grass, no property protection plan, and high volumes of tourists leading to unmanageable number.
- **Commercial forests** e.g. Community plantations and commercial native forests; Some community plantations are abundant with tall trees of eucalyptus species therefore there are at a high fire risk as

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they are located outside built up areas and surrounded by bushes therefore proper management needed.

- **Drinking water catchments** e.g. Natural pans, boreholes; Natural Pans are located in the Forest reserves and National Park and therefore tourists do illegal camping around those and therefore there is need to manage those areas as they poses low fire risk as they might be the start of many fires.

c) **Environmental**

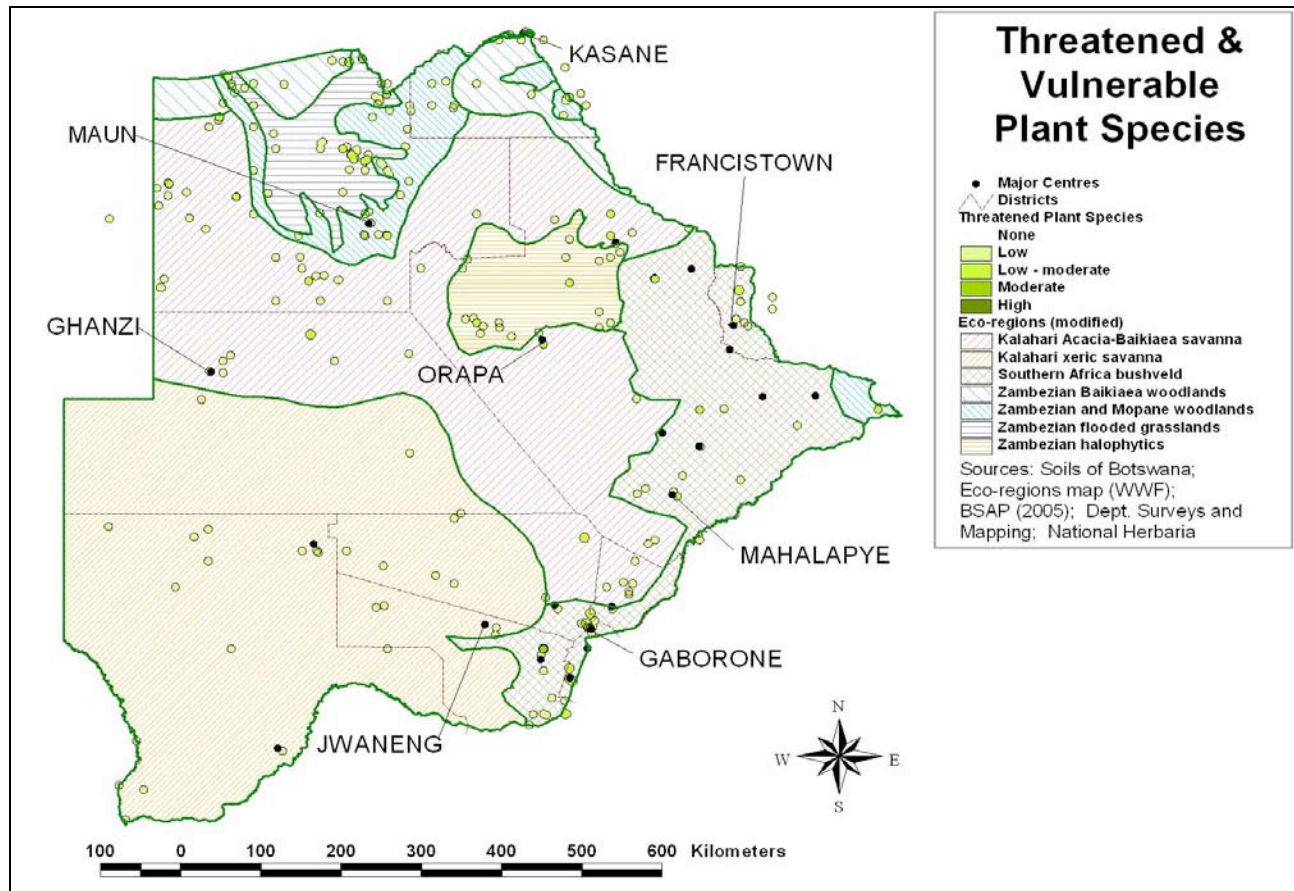
Chobe District is endowed with abundance of flora and fauna. The two are very pivotal to the mainstay of the tourism sector. The local community livelihood is also dependant on the natural resources found in the area. The following ecological regions exist in Chobe District (Figure 3).

- *Zambezi*an *Baikiaea* woodlands
- *Zambezi*an and Mopane woodlands
- *Kalahari Acacia– Baikiaea* Savanna

All the three (3) eco-regions are vulnerable to different factors which includes amongst others over exploitation, invasive species including bush fires.

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Figure 3: Eco- regions of Botswana



d) Cultural

- **Indigenous significance** – Indigenous places and items of significance; The District has areas sited to be of national importance those are Lesoma BDF Monument, Nyungwe Site, Kabolabola Site, Kasane salt water Spring.
- **Non-indigenous heritage** – places and items arising from the early occupation, and other non-indigenous settlers; and

3.1.4 Assessing the Bush Fire Risk - Consequence

Once the assets were identified, the consequence of a bush fire impacting on these assets was assessed. See **Table 3** for the consequence ratings.

The different asset types had different assessment processes used to determine the consequence. These processes are identified below.

I. Human Safety Impact

A potential fire behaviour model using vegetation type, slope and separation distance was used to produce a threat rating for human settlement assets. The vulnerability of the asset to a bush fire was also assessed and a rating assigned. These ratings were then used to assess

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the consequence of a bush fire impacting upon a human settlement asset.

Special Fire Protection (SFP) assets were considered inherently more vulnerable to bush fire due to mobility capacity, knowledge or other issues relating to their inhabitants, (e.g. the elderly, infirm, children or tourists) and therefore stricter requirements for vulnerability assessment and rating were applied.

II. Business Capability

The level of business continuity impact, as well as the length of time taken to recovery (how long and complicated a normal business recovery will be) of the asset were identified. These ratings were used to assess the consequence of a bushfire impacting upon an economic asset.

III. Community Impact

The level of impact effecting the general Chobe District community, as well as the length of time taken to recovery (how long and complicated a normal operating community recovery will be) of the District community. These ratings were used to assess the consequence of a bushfire impacting upon a community asset.

IV. Environmental

Environmental assets with known minimum fire threshold were assessed to determine if they were at risk of a bush fire within the 5 year life of the BFRMP using fire history data and knowledge. The vulnerability of an environmental asset was determined by its conservation status and its geographic extent (distribution across the landscape). Vulnerability and potential impact of bush fire were used to assess the consequence of a bush fire impacting upon an environmental asset.

V. Financial Impact

The level of financial impact from a bush fire impacting on the Chobe District. This includes Private and Government entities. These ratings were used to assess the consequence of a bushfires effect financially on a community, individual or commercial operations.

VI. Reputational Impact

The level of damage to the reputation of the Chobe District from a bush fire impacting on it. This may be from loss of flora and fauna, loss of respect from the local, regional, and international

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communities, as well as the trust placed on agencies and keep them safe within the Chobe District. These ratings were used to assess the consequence of a bushfires effect on the reputation of the District.

3.1.5 Assessing the Bush Fire Risk - Likelihood

For all asset types the likelihood of a bush fire occurring was assessed. This involves considering fire history, including ignition cause and patterns, known fire paths, access, containment potential and potential fire run (size of the vegetated area). See **Table 6** for the likelihood ratings.

3.1.6 Identifying the level of risk

The consequence and likelihood ratings were then used to identify the level of risk. See **Table 5** for the risk ratings.

3.1.7 Evaluating the Bush Fire Risk

Once the risk ratings for each asset were identified, they were evaluated to:

- Confirm that risk levels identified in the risk analysis process are appropriate and reflect the relative seriousness of the bush fire risk
- Identify which assets require treatments; and
- Identify treatment priorities.

3.1.8 Prioritising Treatments

No organisation has limitless resources to deal with adverse risk. It is therefore necessary to define priorities. The bush fire risk ratings determined were used to prioritise the risk treatments, i.e. areas of Critical risk were considered first for treatment, followed by high, medium and low.

3.1.9 Risk Acceptability

Risks below a certain level were assessed as not requiring treatment within the life of this plan. This is due to a combination of risk priority and capacity to undertake the works required. Within the District, the level of risk acceptability is the medium to low risk rating. These risks are likely to be managed by routine procedures and so do not require a specific application of resources.

3.1.10 Treating the Risk

3.1.10.1 Bush Fire Management Zones

Bush Fire Management Zones were identified within the District. These zones identify the fire management intent for a specific area. The four categories of Bush Fire Management Zones are:

- Asset Protection Zone (APZ)
- Strategic Fire Advantage Zone (SFAZ)
- Land Management Zone (LMZ) and
- Fire Exclusion Zone (FEZ).

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

4.0 BUSH FIRE RISK ANALYSIS AND EVALUATION

This chapter describes the bush fire risk assessment process used by the Chobe District BFMC. It provides an explanation of what is meant by the term bush fire risk, and how the level bush fire risk across the District BFMC area was determined and evaluated. A brief description of the key risk areas within the BFMC is also included.

4.1 Bush Fire Risk

Bush fire risk is defined as the chance of a bush fire igniting, spreading and causing damage to assets of value to the community.

Three steps were used in the bush fire risk analysis process:

- Determining the likelihood of bush fire risk
- Determining the consequence of bush fire risk.
- Determining the level of bush fire risk.

4.1.1 Determining the likelihood of bush fire risk

For the purposes of bush risk management planning process, likelihood was described as the chance per year of a bush fire occurring in the BFMC area over the time periods identified in **see Figure 1**. The likelihood of a bush fire occurring was determined using fire history data or local knowledge.

Table 2: Likelihood ratings for bush fire risk

Rating	Description and indicative probability
Almost certain	Expected to occur, many recorded incidents, strong anecdotal evidence, high opportunity, reason or means to occur; may occur or be exceeded once in every 5 years.
Likely	Will probably occur; consistent record of incidents and good anecdotal evidence; considerable opportunity, reason or means to occur; may occur or be exceeded once in every 10 years.
Possible	Might occur; a few recorded incidents in each locality and some anecdotal evidence; some opportunity, reason or means to occur; may occur or be exceeded once in every 20 years.
Unlikely	Is not expected to occur; isolated recorded incidents in this country, anecdotal evidence in other communities; little opportunity, reason or means to occur; may occur or be exceeded once in every 30 or more years.

For each asset listed on the risk register, a likelihood rating was determined and incorporated into the register **see table 5**.

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4.1.2 Determining the Consequences of the Bush Fire Risk

The consequence of a bush fire event was determined by considering the vulnerability of the asset. Vulnerability is related to the capacity of an asset to cope with or recover from the impacts of a bush fire. Different assets have different abilities to cope with a bush fire. This means that when different assets are exposed to the same bush fire, the impact of the fire on those assets is likely to be different. Therefore, the consequence rating for the assets will be different.

To determine the consequences of bush fire risk, the BFMC used **Table 3** of consequence ratings. When determining the consequence ratings, the BFMC considered the vulnerability of each asset and determine which description best matches the anticipated consequences of a bush fire event. **Table 5** provides a detailed methodology that was undertaken.

For each asset listed on the risk register, a consequence rating was determined and incorporated into the register **see table 3**.

Table 3: Determining consequence ratings.

Description	<i>Human life and health</i>	<i>Property, financial, environmental, cultural</i>
Minor	No fatalities. Small number of minor injuries. First aid treatment may be required. No people are displaced. Little or no personal support required (support not monetary or material).	Inconsequential or no damage Little or no disruption to community No measurable impact on environment or cultural asset. Biodiversity regimes of vegetation communities not exceeded. Little or no financial loss.
Moderate	Medical treatment required but no fatalities. Some hospitalisation. Localised displacement of people who return within 24 hours. Personal support satisfied through local arrangements.	Localised damage that is rectified by routine arrangements. Normal community functioning with some inconvenience. Small impact on environment/ cultural asset with no long term effects or small impact on environment with long term effect. Biodiversity regimes for vegetation communities exceeded only once. Significant financial loss (but not enough to constitute a major impact on the economic base of the area).

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<p>Major</p>	<p>Possible fatalities. Extensive injuries, significant hospitalisation. Large number displaced (more than 24 hours duration). Extensive resources required for personal support.</p>	<p>Significant damage that requires external resources. Community only partially functioning, some services unavailable. Significant damage to the environment/ cultural asset which requires major rehabilitation or recovery works. Biodiversity regimes for vegetation communities exceeded twice in the last two fire events. Localised (this may range from loss of a single population to loss of all of the species within the BFMC area (for a species which occupies a greater range than just the BFMC area) extinction of native species. Significant financial loss– some financial assistance required (Economic base of the community is significantly impacted for an extended period of time). Impact on climate.</p>
<p>Catastrophic</p>	<p>Significant fatalities. Large number of severe injuries. Extended and large number requiring hospitalisation. General and widespread displacement for extended duration.</p>	<p>Extensive damage. Extensive personal support. Community unable to function without significant support. Permanent damage to the environment. Extinction of a native species(This category is most relevant to species that are restricted to the BFMC area, or also occur in adjoining BFMC areas and are likely to be impacted upon by the same fire event). In nature means wild specimens and does not include flora or fauna bred or kept in captivity.</p>

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4.1.3 Determining the Bush Fire Risk

The level of bush fire risk was determined using the combination of likelihood and consequence. See **table 4** shows the risk levels used by the BFMC.

Table 4: Determining the level of risk.

Consequence Likelihood	<i>Minor</i>	<i>Moderate</i>	<i>Major</i>	<i>Catastrophic</i>
<i>Almost certain</i>	Medium	High	Extreme	Extreme
<i>Likely</i>	Low	Medium	High	Extreme
<i>Possible</i>	Insignificant	Low	Medium	High
<i>Unlikely</i>	Insignificant	Insignificant	Low	Medium

For each asset listed on the risk register, a level of risk was determined and incorporated into the register see **Table 6**.

4.1.4 Evaluating the Bush Fire Risk

The assigned bush fire risks were evaluated to:

- Determine that risk levels resulting from the risk analysis process reflect the relative seriousness of bush fire risk to each asset;
- Identify treatment priorities;
- Identify which risks require treatment.

4.1.5 Confirming the risk levels

Through a process of stakeholder participation, the risk levels determined during the risk analysis step were reviewed to ensure:

- They reflect the relative seriousness of bush fire risk to each asset;
- That the likelihood and consequence descriptions assigned to each asset were appropriate; and
- Those local issues were considered.

4.1.6 Treatment priorities

No organisation has limitless resources to deal with adverse risk. It was therefore necessary to define priorities.

- The levels of bush fire risk determined in section 3.5 were used to prioritise the risk treatments, i.e. areas of extreme risk were considered first for treatment.
- It was also necessary to prioritise within the risk levels

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i.e. determining which of the high risks is the most serious. The Committee considered that high risk areas which have the higher consequence rating were treated first.

- The assigned treatment priorities were recorded in the risk register **see table 7**.

4.1.7 Risk Acceptability

Following community participation, any risks considered acceptable by the community were documented on the risk register **see table 6**. These risks did not require further analysis or treatment. They will however, be monitored or reviewed as conditions alter over time.

Any risks which were considered to be unacceptable, required risk treatments to address the risk.

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5.0 BUSH FIRE RISK TREATMENTS

The purpose of treating risks is to reduce their likelihood and harmful consequences to the community and environment. This is achieved through a process of selecting and implementing risk treatment options that modify the characteristics of the hazard, the community or the environment.

There are a large number of possible risk treatment options. To implement all of them is not cost-effective or even possible. It is necessary to choose the most appropriate mix of risk treatment options.

This chapter describes: the bush fire risk treatment options considered by the Chobe District BFMC and the risk treatment plan.

5.1 Risk Treatments

Treatment options can include one or more of the following for managing bush fire risk:

Avoid the risk	Decide not to proceed with the activity likely to generate a bush fire risk. This option is relevant to future land use decisions.
Reduce the likelihood	Programs to reduce the number of bush fire ignitions.
Reduce the consequence	Programs to reduce the bush fire hazard and/or increase the resilience of community and environmental assets to bush fires.
Share the risk	Another party or parties share some part of the bush fire risk. This option includes purchasing fire insurance and community agreed fire arrangements.
Retain the risk	After risk have been changed or shared, there are residual risks that are retained. These residual risks will be managed by fire response strategies.

Assets which were of unacceptable risk were considered for treatment options using a landscape approach. If assets were listed in more than one category, then the treatment option had to be appropriate for each asset category.

Selecting the most appropriate treatment option or options involved balancing the costs of implementing each option against the benefits derived from it. In general, the cost of managing risks needed to be commensurate with the benefits obtained. More than one treatment option could be assigned to the asset.

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5.2 Risk Treatment Plan

Risk treatment plans are action plans that identify how the chosen treatment option is to be implemented. The risk treatments detailed in the sections below have been agreed to by the land owner or managers.

The responsibility for implementation of the bush fire risk management plan rests with the owners or occupiers of the land (land managers) on which the bush fire risk is situated. This imposes this responsibility on both public and private land managers. The risk treatments included in this plan are “notified steps” under section 63 of the *Rural Fires Act 1997*.

5.2.1 Avoid the Risk

Avoid the risk treatments means not proceeding with the activity likely to generate the bush fire risk.

5.2.2 Reduce the Likelihood

Reduce the likelihood treatments means reducing the number of bush fires occurring.

5.2.3 Reduce the Consequences

Reduce the consequences treatments means reducing the extent of losses from bush fires by reducing the bush fire hazard and /or increasing the resilience of assets to bush fires.

a) Reduce the Hazards

Hazard reduction programs aim to reduce the severity of a bush fire, by reducing the amount of fuel available to burn during a bush fire. This makes the bush fire easier to control and reduces the level of bush fire damage to community and their assets.

Hazard reduction burning is the most common way to reduce the bush fire hazard, as it is the most cost effective method available. However, other methods of hazard reduction such as slashing or mowing, ploughing, grazing or hand clearing are used when appropriate.

b) Bush Fire Management Zones for Chobe District BFM Areas

Based on the results of the bush fire risk analysis for Chobe District BFMC area, a series of bush fire management zones have been identified. Bush fire management zones identify those areas within the Chobe District BFMC area where the bush fire risk management strategies will focus on the management of the bush fire hazard (or fuel).

c) Environmental Assessment

All works must have the necessary environmental assessments completed prior to commencement e.g. firebreak construction. Land managers should use following the Environmental Impact Assessment processes in conducting this exercise. The tool provides a streamlined environmental assessment process for use by issuing authorities and certifying authorities being Department Environmental Affairs in determining applications for bush fire hazard reduction work method.

d) Use of appropriate fire regimes

A fire regime is essentially the combination of fire frequency (usually measured by the number of years between fires – both wild and prescribed), fire intensity, and season of fire occurrence. To identify the fire regime of an area requires assessment of the fire attributes over a long period of time (normally decades but in some cases centuries). In many areas an ‘adaptive management’ approach is used by land managers such that the fire regimes applied are determined from a combination of the best fire history and fire ecology information available.

An inappropriate fire regime is considered to be one where (usually through the decisions or actions of humans) one or more of the fire attributes is occurring outside its historic range of variation for the area. Where such a change is allowed to continue, changes to the environment are likely to result. Examples of this include areas where prescribed fire is applied too frequently, areas where fire occurrence is reduced (through wildfire suppression and cessation of prescribed burning) such that fires are less frequent and more intense, and areas where the season of burning is changed.

The following guidelines were developed to assist land managers and fire agencies in considering appropriate fire regimes for the Chobe District bush fire disaster management committee area.

e) Increase the resilience

Programs aimed at increasing the resilience of an asset aim to reduce the impact of a bush fire on assets by increasing the ability of assets to withstand and recover from a bush fire.

f) BFMC Fire Trail Register

The Bush Fire Coordinating Committee requires a BFMC to regularly maintain and update a local Fire Trail Register linked to the Bush Fire Risk Management Plan. The Fire Trail Register for Chobe District BFMC is included in a map of fire breaks in Annexure 9.

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5.2.4 Share the risk

Share the risk means involving another party bearing or sharing some part of the bush fire risk.

5.2.5 Retain the risk

After bush fire risks have been reduced or shared, there will be residual risks that are retained. Retained risks will be managed by fire response strategies. In areas where the bush fire risk has been assessed as acceptable existing fire response arrangements will be used to manage these risks.

a) Bush Fire Danger Period

The bush fire danger period commences on the May each year and ends on November the same year. A permit must be obtained to light a fire for land clearance or bush fire hazard reduction purposes at all times.

If the bush fire danger period is varied, then a notice must be published in a government gazette, public radio/ BTV and any legal newspaper.

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6.0 IMPLEMENTATION

The implementation of the Bush Fire Risk Management plan will be the responsibility of the District Disaster Management Committee led by the District Administration Office. The Department of Forestry and Range Resources as the leading agency will provide technical assistance and overall coordination of fire management activities. However all land owners with properties susceptible or threatened by bush fires are expected to develop and implement fire management strategies. The land owners, Government agencies, parastatals and other agencies are also required to implement the Annual Plan of Operations and report to the DDMC on progress made fire management activities for their respective agencies. Refer to Annual Plan of Operations on Annexure 11 on page 43.

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

7.0 MONITORING AND REVIEWING

An essential component of the bush fire risk management planning process is the monitoring and periodic review of the plan. Monitoring provides routine surveillance of actual performance for comparison with expected or required performance. Review involves periodic investigation of the current situation, usually with a specific focus.

This chapter describes how the bush fire risk management plan will be monitored and reviewed by examining:

- Changes to context and bush fire risks;
- Post event analysis;
- Annual reporting measure; and
- The effectiveness of the risk treatments (risk management performance measures).

7.1 Reviewing the plan

The Chobe District Disaster Management Committee will review, as necessary, the Bush Fire Risk Management Plan (BFRMP). For example, a review of the BFRMP may be necessary if there are changes in the DBFRM area, organisational responsibilities or legislative requirements. There may also be changes to the bush fire risks due to changes in potential bush fire hazard or assets.

Following a major fire event, the BFRMP will be reviewed to assess if the results of the bush fire risk management process was appropriate. This review will consider the following questions:

Did we previously identify and analyse the risks involved?

- Were the consequences of the bush fire as predicted by the risk analysis?
- Were the estimates of likelihood accurate?
- Were the treatment options instrumental in reducing either the consequences or the likelihood?
- Are other treatment options now obvious in the light of the bush fire?
- How could our risk management process in general be improved?

The results of these reviews may lead to alterations in risk analysis, evaluation or treatment plans.

If there are significant changes made to the Chobe District Bushfire Risk Management Plan, then a revised draft bush fire risk management plan will be exhibited for a period of not less than 42 days during which time submissions are invited from the public.

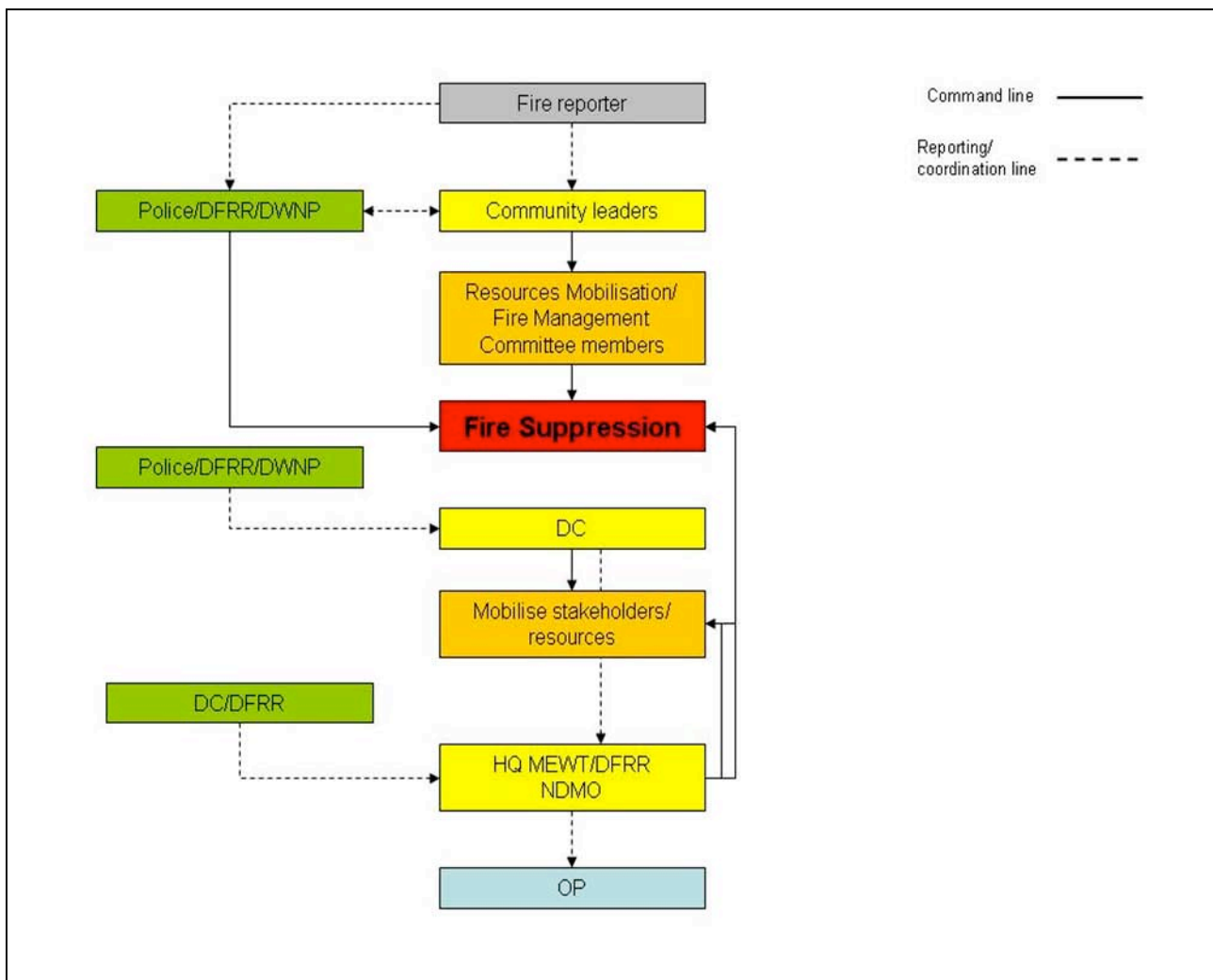
9.0 RESEARCH

The regular and intense Bush Fires impact on biodiversity remains unknown in the District therefore research is needed to fire prone areas so that proper measures can be applied. Research and learning institutions will therefore play a major role in future decision making and management of the biodiversity. To monitor the effect of fire management on vegetation, monitoring sites (in a range of habitats) will be established throughout the District. Each site will be marked and surveyed annually towards the end of the wet season in April. Photographs and vegetation community structure parameters will be collected.

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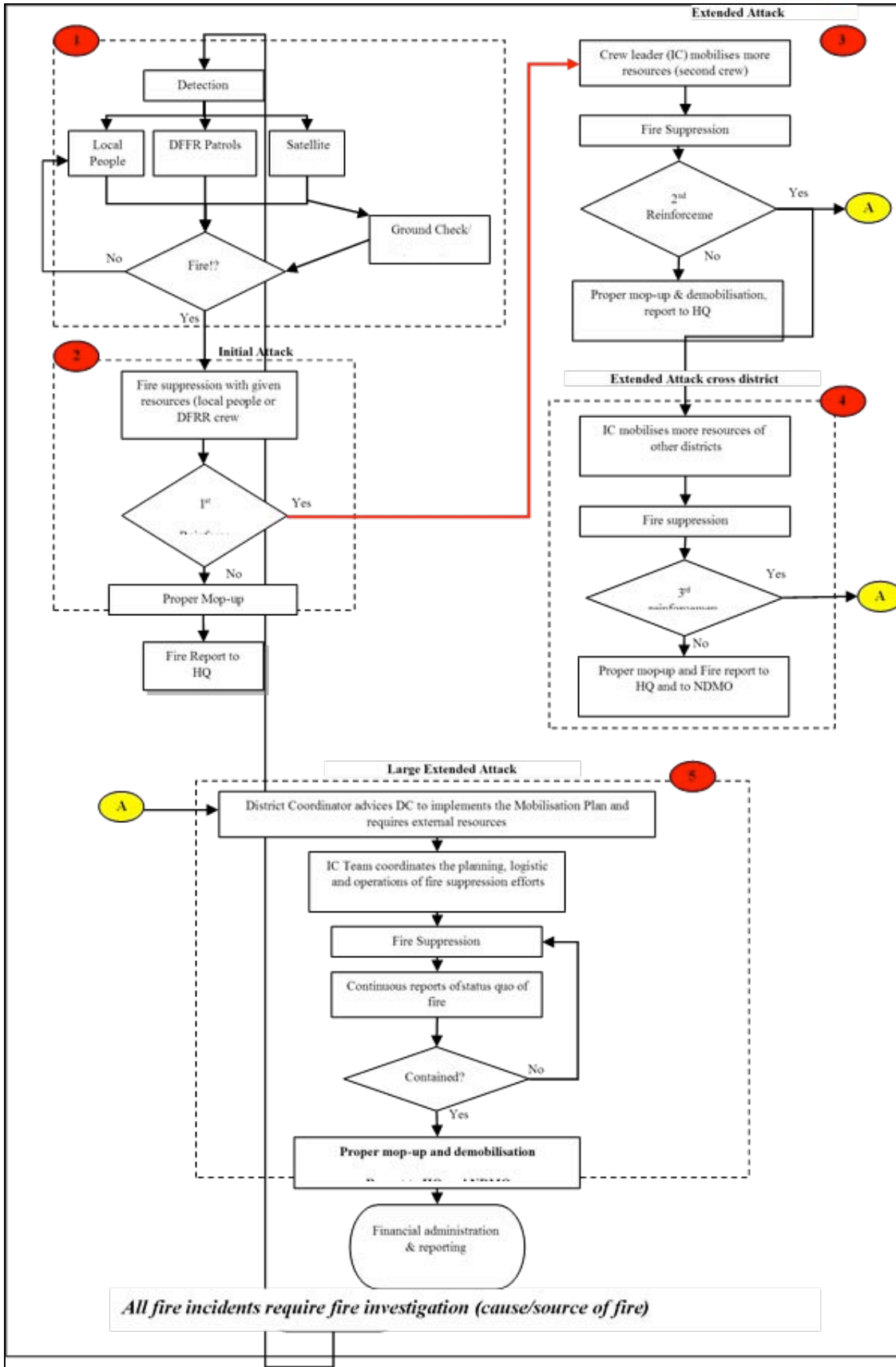
8.0 ANNEXURES

Annexure 1: Incident command structure



CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Annexure 2: Mobilisation structure



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Annexure 3: Risk Assessment

Table 5: Risk Assessment

PROBABILITY 5 ALMOST CERTAIN – expected to occur in most circumstances 4 LIKELY – will probably occur in most circumstances 3 POSSIBLE – might occur sometime 2 UNLIKELY – could occur sometime 1 RARE – may occur in exceptional circumstances		CONSEQUENCE 5 EXTREME – serious injuries, death, serious management/government intervention, sig financial loss 4 MAJOR - serious injuries, reporting to government, management intervention, media coverage, financial imp 3 MODERATE – injuries, moderate management intervention, breach of legislation, some financial impact 2 MINOR – Incident (injury) minor breach of legislation, small financial impact, limited impact on reputation 1 INSIGNIFICANT – no injuries, insignificant breach of legislation, no financial impact, no impact on reputation							Treatment/ Controls to eliminate/ minimise risks	Task owner
Asset Type	Detail of Risk	Causes	Worst consequences	Risk Owner (Agency)	Risk Prob	Risk Consq .	Auto	Risk RT G		
Human	Fire Fighters	Failure to identify hazards and risk , unfit fire fighters	Serious injury or death	Individual agency	3	5		15	Crew fire fighting techniques trainings, adequate PPE, Communications, Maps, Medical check ups for fire fighters	All Agencies
Human	Community property	Lack of capacity at local level	Loss of property, uncontrollable fires	ODC	2	3		6	Resuscitate local level structures and empower local communities	ODC
Human	Fire used as Management tool	Human activities, Lack of knowledge and skills	Serious injury or death,	DDMC	3	3		9	Education and awareness campaigns, law enforcement, review of the existing legislation, fire investigation	DFRR
Economic	Tourism Facilities	Lack of proper property planning for facilities	Significant financial loss	Business owner	3	5		15	Prescribed burning (Hazard reduction)	HATAB
Economic	Private Farms	Lack of proper property planning for facilities	Significant financial loss	Ranch owner	2	4		8	Fire management planning (Property)	Farmers Associations
Economic	Electric sub stations, transmission lines	Lack of proper property planning for facilities	Significant financial loss	BPC	2	4		8	Hazard reduction	BPC
Economic	Telecommunication transmitters	Lack of proper property planning for facilities	Significant financial loss	BTC	2	4		8	Hazard reduction	BTC
Economic	Natural resources of high economic value (flora & fauna)	Human activities and high fuel loads	Loss of economic benefits from natural resources	DFRR & DWNP	4	4		16	Community education, fire break maintenance, prescribed burning	DFRR & DWNP
Economic	Airport and	Human activities and	Financial loss	CAAB	2	2		4	Hazard reduction	CAAB

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	Airstrips	high fuel loads								
Cultural	Heritage sites	Human activities, High fuel loadings	Loss of cultural Heritage (tangible)	DNMM, DFRR	4	5		16	Fire break construction and maintenance, Prescribed burning (Hazard reduction)	DNMM
Cultural	Heritage sites	Human activities, High fuel loadings	Loss of cultural Heritage (tangible)	DNMM,DF RR	4	5		20	Fire break construction and maintenance, Prescribed burning (Hazard reduction)	DNMM
Cultural	Heritage sites	Custodianship of heritage sites wholly the responsibility of government agency	Loss of cultural Heritage (tangible)	DNMM,DF RR	4	5		20	Public education, implementation of CBNRM policy	DNMM, DFRR
Cultural	Heritage sites	Custodianship of heritage sites wholly the responsibility of government agency	Loss of cultural Heritage (tangible)	DNMM,DF RR	4	5		20	Public education, implementation of CBNRM policy	DNMM, DFRR
Cultural	Natural and cultural properties	Human activities, High fuel loadings	Loss of cultural Heritage (tangible)	DNMM	2	3		12	Property protection planning, hazard reduction	DNMM
Environmental	National Parks, Forest Reserves, WMA	High fuel loadings, human activities	More frequent uncontrollable fires affecting flora and fauna negatively	DWNP	4	3		12	Implementation of community based fire management programme, Fire break construction and maintenance, Prescribed burning (Hazard reduction)	DWNP
Environmental	Natural resources (Flora & Fauna)	High fuel loadings, human activities	Extinction of natural resources (fire intolerant species)	DFRR & DWNP	4	3		12	Implementation of community based fire management programme, Fire break construction and maintenance, Prescribed burning (Hazard reduction)	DWNP
Environmental	Concession areas	High fuel loadings, human activities	Financial loss, Extinction of natural resources (fire intolerant species)	DWNP	4	5		20	Implementation of community based fire management programme, Fire break construction and maintenance, Prescribed burning (Hazard reduction)	DWNP, Community trusts,BT O

KEY

Level of rating	Risk rating	Colour code
15 -25	Critical	Black
10 -14	High	Red
5 – 9	Medium	Gold
< 5	Low	Green

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Annexure 4: Asset and Risk Register

Tables 6: Asset and Risk Register (Human settlements, Economic, Environmental and Cultural Assets)

Human settlement assets, risk register

Asset	Consequence rating	Likelihood rating	Risk rating
Ploughing Fields	Moderate	Likely	High
Homes	Moderate	Possible	Medium
Cattle posts	Minor	Possible	Low
Bore holes	Minor	Highly Unlikely	Low
Water bodies	Minor	Unlikely	Low

Economic assets, risk register examples

Asset	Consequence rating	Likelihood rating	Risk rating
Lodges and Camp sites	Major	Likely	High
Settlements	Major	Unlikely	Low
Commercial Farms	Moderate	Possible	Medium
Kasane International Airport	Major	Possible	High

Environmental assets, risk register

Asset	Consequence rating	Likelihood rating	Risk rating
Forest Reserves	Major	likely	High
Chobe National Park	Major	likely	High
River	Major	Likely	High
Natural Pans	Moderate	likely	High

Cultural heritage assets, risk register

Asset	Consequence rating	Likelihood rating	Risk rating
Lesoma BDF Monument	Moderate	Unlikely	Low
Cemeteries	Moderate	Unlikely	Low
Traditional/Medicinal Plants	Moderate	likely	High
Seboba Cultural Village	Major	Likely	High

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Annexure 5: Risk Treatment Plan

Table 7: Risk Treatment Plan

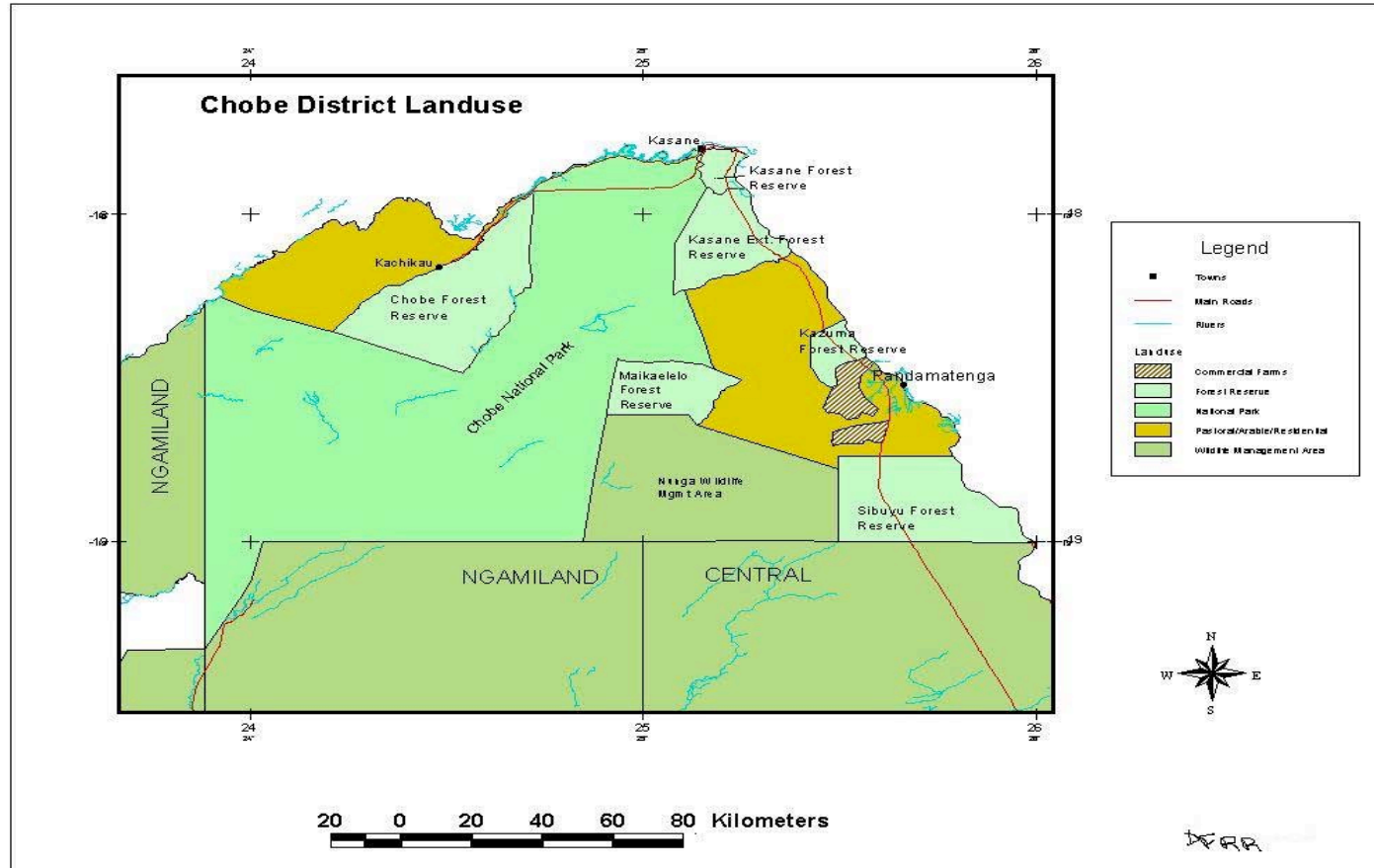
Asset	Priority	Action (What, Where, How, Timeframe)	Responsibility (Who)
Chobe National Park	Early burning exercise from Sedudu to Phoha Gate. Maintenance of internal roads and Fire Breaks Patrols around the Park	Early burning exercise from Sedudu to Phoha Gate. Maintenance of internal roads and Fire Breaks. Patrols around the park by 31 May Annually.	DWNP, Community Fire Fighting Teams and DFRR
Forest Reserves	Early burning exercise from Lesoma to 256 Km Area along the Botswana/Zimbabwe Boarder and along the tarred road from Lesoma village to 256km Area. Maintenance of Internal Fire breaks (10m wide) in all Forest Reserves. Sub-Contracting of Maintenance of External Fire Break (20m Wide) Maintenance around forest Reserves boundaries. Patrols in Forest Reserves.	Early burning exercise from Lesoma to 256 Km Area along the Botswana/Zimbabwe Boarder and along the tarred road from Lesoma village to 256km Area. Maintenance of Internal Fire breaks (10M wide) in all Forest Reserves. Sub-Contracting of Maintenance of External Fire Break (20 M Wide) Maintenance around forest Reserves boundaries. Patrols in Forest Reserves by 30 June annually.	DFRR, Community Fire Fighting Teams and DWNP
Major Roads A3	Lawn mowing along the A33 major road from Kazungula to 105Km Area, and Sedudu gate to Ngoma Road.	Lawn mowing along the A33 major road from Kazungula to 105Km Area, and Sedudu gate to Ngoma Road by 31 May annually.	Dept. of Roads, DWNP and DFRR
Pandamatenga Commercial Farms	Maintenance of Fire Breaks (10m Wide)around the perimeter fence of Pandamatenga commercial farms Controlled burning	Maintenance of Fire Breaks (10m Wide)around the perimeter fence of Pandamatenga commercial farms Controlled burning by 31 May annually	Commercial Farmers, Chobe Land Board and DFRR

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Concessionaires	Fire Management and Maintenance of Fire Breaks around and inside the concession areas.	Maintenance of Fire Breaks around and inside the concession areas by 31 May Annually.	BTO, Community Trusts, Community Fire Fighting teams and DFRR
Grass Land Areas	Mapping and Zoning of Grass land Areas	Mapping and Zoning of Grass land Areas at Kachikau, Satau, Parakarungu, Pandamatenga, and 256 Area by 31 May 2016.	CLB, Community Trusts and DFRR
Lodges	Nomination of 2-3 employees for Training on Training of Trainers on Bush Fighting to be trained by Forestry	Nomination of 2-3 employees for Training on Training of Trainers on Bush Fighting to be trained by Forestry by 30 June 2016.	HATAB,BTO and DFRR
Camp Sites	Nomination of 2-3 employees for Training on Training of Trainers on Bush Fighting to be trained by Forestry.	Nomination of 2-3 employees for Training on Training of Trainers on Bush Fighting to be trained by Forestry by 30 June 2016.	HATAB, BTO and DFRR
Settlements	Training of Local villagers on Basic Bush Fire Fighting and formation of Fire Teams per village Distribution of Fire Beaters per village Kgotla.	Training of Local villagers on Basic Bush Fire Fighting and formation of Fire Teams per village Distribution of Fire Beaters per village Kgotla by 30 June 2016.	DIKGOSI,VDC,TRUST DFRR and COUNCIL FIRE BRIGADE
Lesoma Monument	BDF Fire break Maintenance around	Grass cutting around the Lesoma BDF Monument by month of May before Fire Season.	BDF
Kasane International Airport	Maintenance of Fire break around the perimeters of the Airport	Grading of Fire break around the Airport perimeter Fence before Fire Season	CAAB
Telephone Lines/Power Lines	Bush Clearing along the telephone lines and Power lines.	Bush Clearing along power lines and telephone lines will be cleared on annual basis.	BPC and BTC

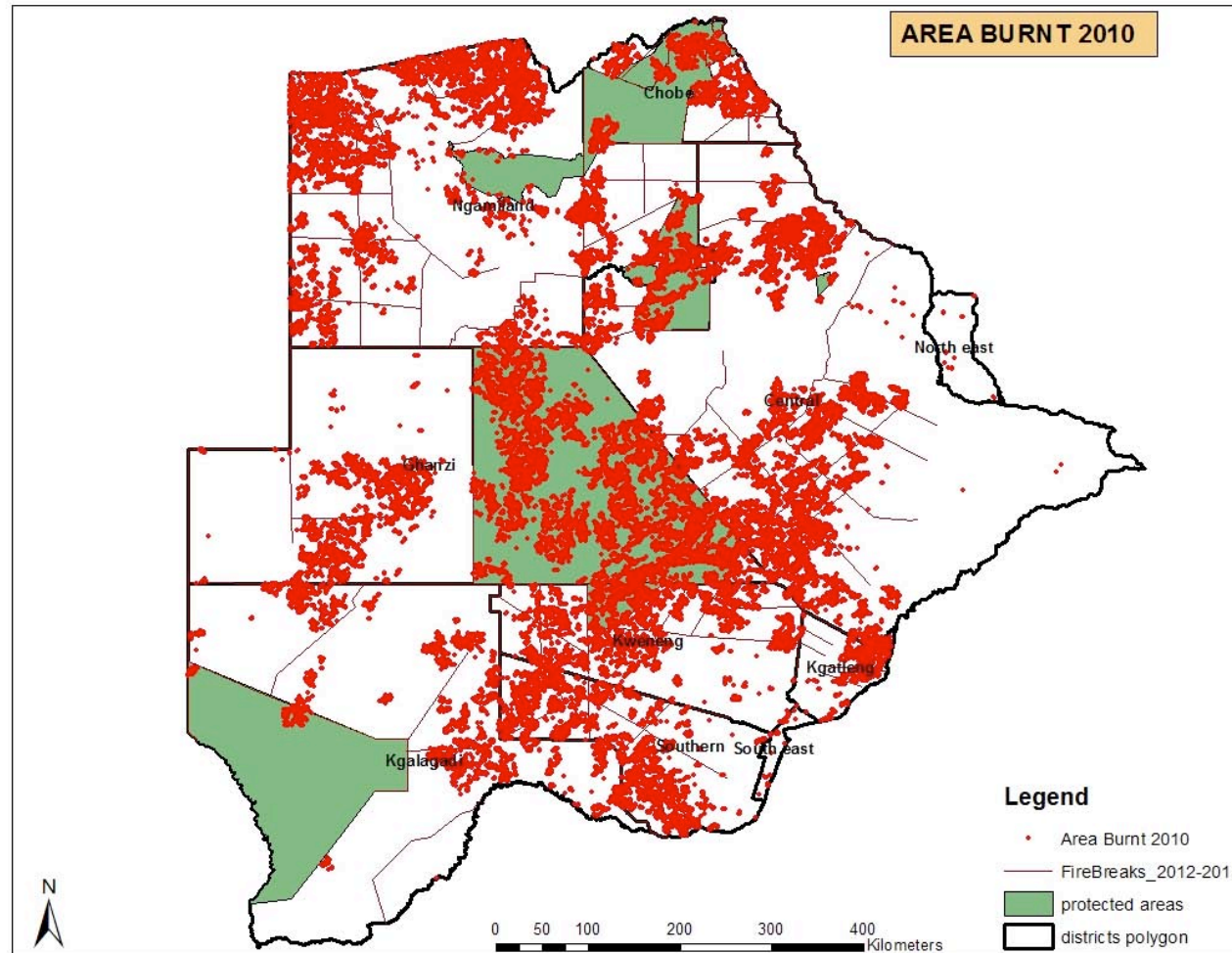
CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Annexure 6: Chobe District Land Tenure Map



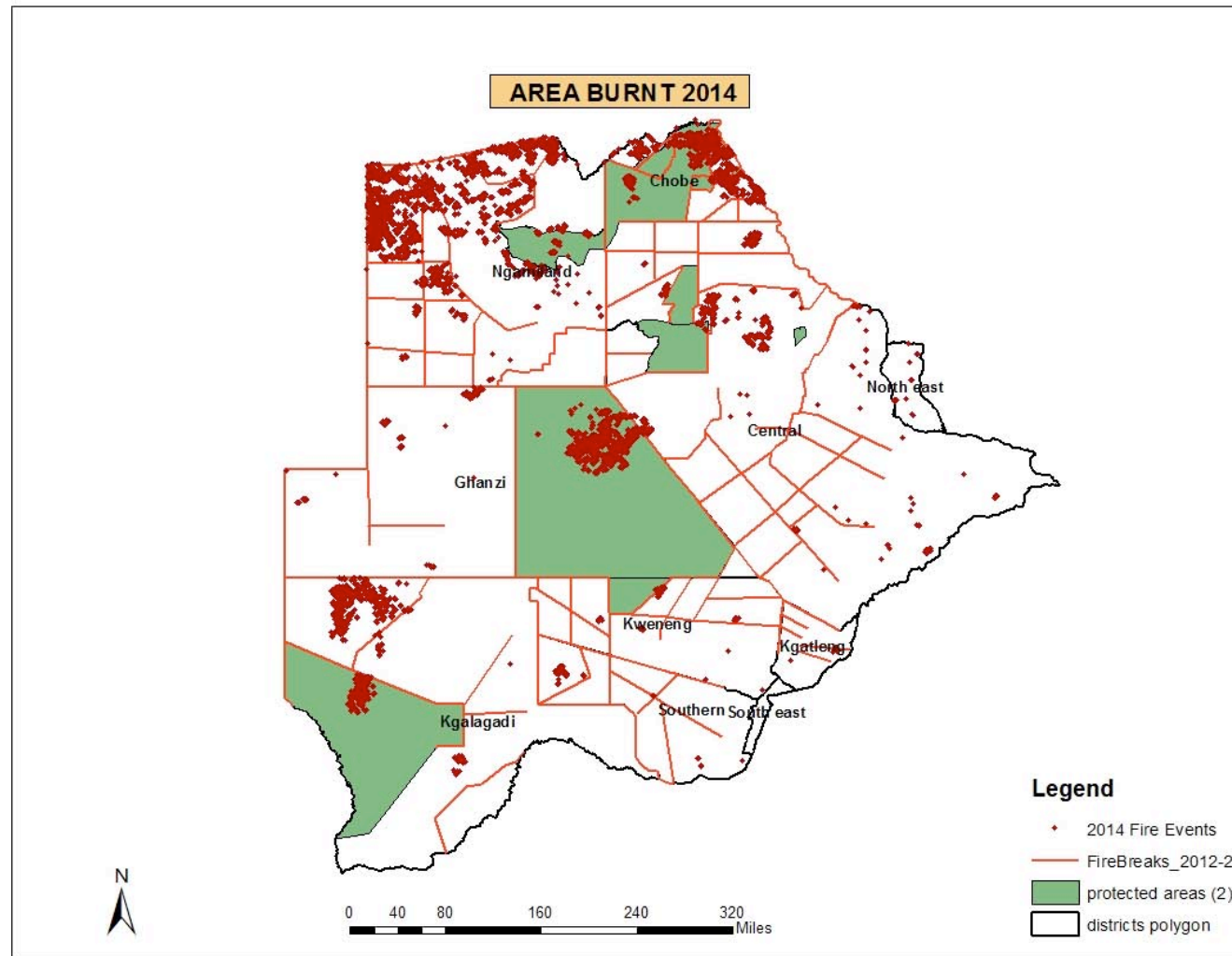
CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Annexure 7: Map for Burnt Area Scars in 2010.



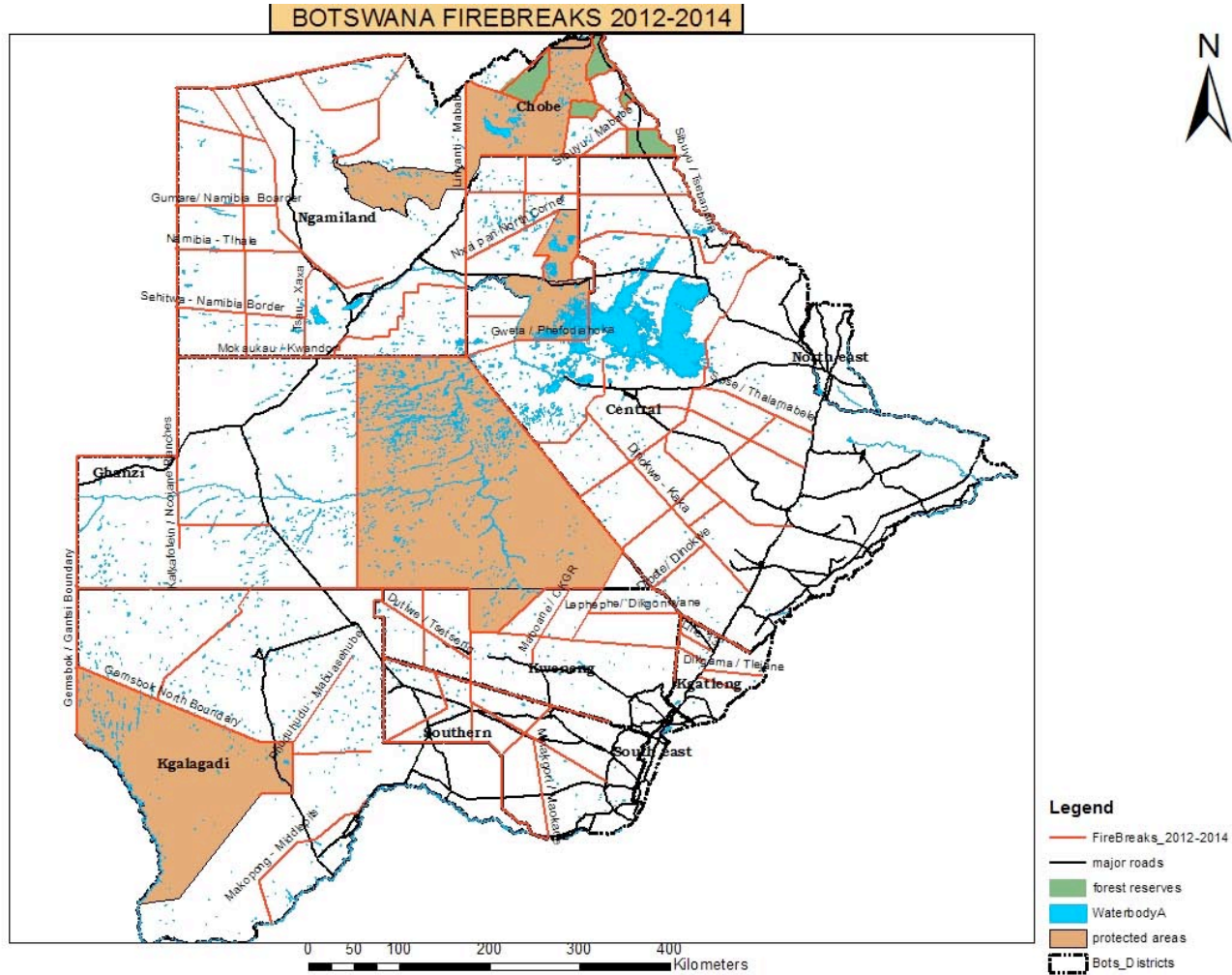
CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Annexure 8: Map for Burnt Area Scars in 2014.



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Annexure 9: Fire breaks/ Trails Map



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Annexure 10: Concessions Areas Leases Information (August 2015)

CHOBE DISTRICT BUSH FIRE RISK MANAGEMENT PLAN

Annexure 11: Annual Operations plan

ANNUAL FIRE MANAGEMENT OPERATIONS PLAN

ASSETS TYPE	DETAIL OF RISK	MITIGATION STRATEGY	RESPONSIBLE ORGANISATION	PERIOD												
				J	F	M	A	M	J	J	A	S	O	N	D	
Human	Fire fighters (Volunteers/ Government employees/ NGO's)	Fire fighting training, adequate PPE, Communications, Maps, Medical check-ups for fire fighters.	DFRR & Fire Brigade Services													
Human	Community	Public education and extend bush fire management to schools	MOESD, DFRR & Fire Brigade Services													
		Fire investigation and law enforcement.	DFRR, Fire Brigade & Botswana Police													
Economic	Tourism facilities	Property fire protection strategies.	Business Owners, HATAB, BOGA													
Economic	Private ranches	Establish community fire units.	DFRR, Farm and Ranch owners.													
		Develop and implement fire management plans.	DFRR and Farmers Association (Chobe East and West).													
Economic	Electric sub stations, transmission lines	Property fire protection strategies.	BPC													
Economic	Telecommunication transmitters	Property fire protection strategies.	BTCL													
Economic	Natural resources of	Research on impact of bush	DFRR, ORI &													

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		Prescribed Early burning exercise.																	
Human, Economic, Cultural & Environment	All assets	Fire detection surveillance tool/ system.	DFRR																